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THE ASTRAL BODY IN RENAISSANCE MEDICINE

By D. P. Walker

Book IV of Jean Fernel's *Physiologia*, first published in his *De Naturali Parte Medicinae*, 1542,¹ is entitled "On Spirits and Innate Heat";² its second chapter contains the following passage:³

In order that the necessity and the substance of the spirit may be more fully shown, we must revisit and recall the doctrines of the ancient philosophers. The Academics⁴ were the first to suppose, when they realized that two entirely dissimilar natures cannot be associated together without the interposition of a suitable mean, that our soul, created by the supreme maker of all things, before its emanation and immigration into this thick and solid body, put on as a simple garment a certain shining, pure body like a star, which, being immortal and eternal, could never be detached nor torn away from the soul, and without which the soul could not become an inhabitant of this world. Then they surrounded the soul with another body, also fine and simple, but less pure, less shining and splendid than the first, not created by the supreme maker, but compounded of a mixture of the finer elements, whence it is named aerial and aethereal. Clothed with these two bodies the soul, entering this frail and mortal body, or rather thrown like an exile into a loathsome and shadowy prison, becomes a guest of the earth until, having broken from this prison and having returned, joyful and free, to its home, it is made a fellow-citizen of the gods.

The occurrence here of this account of the Neoplatonic astral body, the star-like vehicle or garment (εχημα, χιτών) of the soul,⁵ is at first sight most surprising. The theory of the astral body was, as we shall see, not generally considered safe or respectable, whereas Fernel's work was a careful and systematic medical treatise, which maintained its position as a standard reference- and text-book for a century. Fernel is quite widely known nowadays through Sir Charles Sherrington's admirable monograph, *The Endeavour of Jean Fernel*,⁶ and through his Gifford Lectures, *Man on his Nature*.⁷ Although

¹ For a bibliography of Fernel's writings see Sir Charles Sherrington, *The Endeavour of Jean Fernel*, Cambridge, 1946, pp. 187 ff.

² "De Spiritibus & Innato Calido"; I shall quote from *Io. Fernelii Ambiani, Medicina*, Paris, André Wechel, 1554.

³ Fernel, *Medicina*, 1554, p. 104: "Quò autem spiritus necessitas atque substantia plenius demonstretur, repetenda sunt & replicanda veterum philosophorum decreta: quorum primi Academici cùm perspicerent fieri non posse ut naturae quammaximè dispares, nullius idonei medij interjectu societatem inirent coirentque, animum nostrum à summo rerum opifice conditum, priusquam emanaret immigraretque denso huic & concreto corpori, censuerunt corpore quodam illustri, puro & astro simili tanquam simplici veste indui: quod immortale & sempiternum nunquam ab animo absolvi divellique posset, & sine quo non fieret hujus mundi incola. Ab hoc deinde alterum corpus animo circumjecerunt, tenue illud quidem ac simplex, sed tamen impurius, minus illustre & splendidum

superiore: non ab summo id opifice creatum, verùm, elementorum praesertimque tenuiorum permistione concretum, à quibus nomen inveniens aëreum & aethereum appellatur. Duobus hisce corporibus jam stipatus animus, in tertium hoc mortale caducumque corpus, seu potiùs in tetrum & tenebricosum carcerem tanquam exul dejectus, terrarum fit hospes, donec effracto carcere alacer & liber in patriam reversus, municeps fiat & civis deorum."

⁴ I.e. the Neoplatonists.

⁵ On the astral body see: G. Verbeke, *L'Évolution de la Doctrine du Pneuma du Stoïcisme à S. Augustin*, Paris, 1945, pp. 267, 306 ff., 368 ff., 374; Proclus, *The Elements of Theology*, ed. E. R. Dodds, Oxford, 1933, p. 313, App. II "The Astral Body in Neoplatonism"; Ralph Cudworth, *The True Intellectual System of the Universe*, 2nd ed., London, 1743, II, 781 ff.

⁶ *Vide supra* note 1.

⁷ 2nd ed., Cambridge, 1951.

I shall have to make one correction in Sherrington's picture of Fernel, we can certainly accept his presentation of him as an enormously successful practical physician who wrote an orderly, rational and comprehensive exposition of the medical science of his time. How is it then that in this exposition we find (and several generations of medical students found) stuff about starlike shining bodies and aethereal garments?

I shall try to explain this odd fact by relating it to the whole of Fernel's doctrine of medical spirits, and shall examine some of the contemporary and later reactions to this doctrine. This seems to me worth doing, first, because it will illustrate by one example the type of confusion engendered by interference between the various distinct, though ultimately related, groups of ideas centred on the term spirit; secondly, because it may throw some light on a neglected patch of the history of medicine and biology, namely, the breakdown and eventual obsolescence of the theory of medical spirits.

Medical spirits are a very fine, hot vapour, deriving from the blood and breathed air. They are corporeal. They are usually divided into three kinds: natural, vital and animal. We shall not be concerned with natural spirits. The vital spirits are manufactured in the heart and conveyed by the arteries; their main function is to distribute innate or vital heat to all parts of the body. Animal spirits are elaborated from these and are contained in the ventricles of the brain, whence through the nervous system they are transmitted to sense-organs and muscles; their functions are motor-activity, sense-perception, and, usually, such lower psychological activities as appetite, *sensus communis* and imagination. They are the first, direct instrument of the soul.

In spite of certain inherent weaknesses and vaguenesses, the theory of medical spirits maintained itself throughout the Middle Ages in a fairly constant and coherent form, based ultimately on Aristotle and Galen, and systematized by the Arabs.⁸ For it also had its strong points: the simple and credible explanations it offered, first, of certain indisputable physiological facts, for example, the obvious difference between arterial and venous blood, or the fact that dead men are colder than live ones, and secondly of the connexion of the brain and nervous system with motor-activity, sense-perception and symptoms of emotion. Its weaknesses consist in the paucity of empirical evidence for the existence of spirits,⁹ and, more important, in dangerous contaminations or confusions with other meanings of the term. The confusions were dangerous both because they might lead towards religious unorthodoxies and because they often produced serious logical and meta-

⁸ See W. W. Jaeger, "Das Pneuma im Lykeion," *Hermes*, Bd. 48, 1913, pp. 29 ff.; Verbeke, *op. cit.*, pp. 12-24 (Aristotle), 206-212 (Galen); an Arabic treatise frequently cited in the 16th century is Costa ben Luca, *De Animae & Spiritus discrimine* (usually attributed to Constantinus Africanus, *Opera*, Basle, 1536, p. 308); cf. Avicenna, *Libri in re medica omnes*, Venice, 1564, I, 78-80, 88, II, 324-9, 369; Albertus Magnus, *De Spiritu & Respiratione* (*Opera Omnia*, ed. Borgnet, IX, Paris, 1890, p. 213).

⁹ The evidence given in Bertacchi's very comprehensive monograph on spirits (*Dominici Bertacchii Camporegianensis Medici ac Philosophi. De Spiritibus Libri Quatuor. Necnon De Facultate vitali Libri Tres*, Venice, 1584, fol. 2^{r-v}) is: the cerebral ventricles must contain something, which must be airy, since they are empty in dead bodies; the spurting forth of arterial blood and semen shows that these heavy liquids must be mixed with something light and mobile; the fact that, if one eye is shut, the pupil of the other dilates, must

physical difficulties,¹⁰ especially when the confusion involved a blurring of the distinction between corporeal spirit and incorporeal soul. This particular confusion was of course likely because of the orthodox Christian meanings of the term spirit, i.e. either the superior, divine part of the soul, or the third person of the Trinity, the Holy Spirit. Melanchthon, for example, in his *De Anima*,¹¹ after an exposition of the medical theory of animal and vital spirits, writes:

Galen, writing on the soul of man, says that these spirits either are the soul, or are its immediate instrument. This is certainly true, and their light surpasses that of the sun and all the stars; and, what is still more marvellous, in pious men the divine spirit itself mixes itself with these same spirits, and by its divine light makes them shine more brightly, so that their knowledge of God may be clearer, their ascent to Him more resolute, and their feelings towards Him more ardent.

The particular confusion which concerns us, namely of medical spirits with astral bodies, is only a starting-point and will lead us to larger and more significant muddles. The theory of the astral body is itself somewhat muddled; the number of bodies or vehicles may be one, as in Porphyry, or two or more, as in Proclus (and, as we have seen, in Fernel), and its substance and its fate after death vary from author to author. For our purposes it will be enough if we bear in mind the following rough outline.

The astral body, or vehicle of the soul, is made of very fine, lucent stuff; this may be identical with the substance of the stars and spheres, through

be due to some kind of spirit being constantly transmitted to both; the instantaneous transmission of heat and cold which produces blushing and pallor from fear must be due to a subtle body. Argenterio gives a somewhat different, but no more convincing list (*Ioannis Argentarii Medici De Somno et Vigilia Libri Duo, in quibus continentur duae tractiones de calido nativo, et de spiritibus*, Florence, 1556, pp. 271-273). Descartes still uses the argument of the cerebral ventricles and other cavities; for him of course these necessarily contained some kind of "matière subtile" (Letter to Vorstius of 19 June 1643, Descartes, *Oeuvres*, ed. Adam and Tannery, Paris, 1897-1913, III, 686-9).

¹⁰ These are particularly acute and apparent in Telesio and his followers, with whom the spirit takes over nearly, or quite, all the functions of the soul (see D. P. Walker, *Spiritual and Demonic Magic*, London, 1958, Ch. VI).

¹¹ Melanchthon, *De Anima Liber unus*, Lyons, 1555, pp. 111-2: "Galenus inquit de anima hominis, hos spiritus aut animam esse, aut immediatum instrumentum animae. Quod certè verum est, & sua luce superant solis & omnium stellarum lucem: & quod mirabilis est, his ipsis spiritibus in hominibus pijs miscetur ipse divinus spiritus: & efficit magis fulgentes divina luce, ut agnitio Dei sit

illustrior, & adscensio firmior, & motus sint ardentiores erga Deum . . . [so also the Devil may occupy the spirits of bad men] . . . Aspiciamus igitur naturam nostram, & diligenter eam regamus: & sciamus, oportere spiritus nostros esse domicilium spiritus sancti: & oremus filium Dei, ut ipse depellat à nobis diabolos, & spiritum divinum in nostros spiritus transfundat." For Galen, *v. infra* note 18. Cf. Servetus, who identifies *spiritus* and *anima* more firmly than Melanchthon: "ille noster spiritus et anima, corpori similiter [as fire to wood] alligatur, unum cum eo faciens eius sanguinem pabulum habens: et ab aëreo spiritu inspiratione et expiratione afflatur, fouetur, et nutritur, ut fit ei duplex alimentum spirituale et corporale. Hac loci [cerebral ventricles] et spiritualis fomenti ratione conueniens admodum fuit, eundem nostri spiritus lucidum natura locum spiritu alio sancto, caelesti, lucido, afflari, idque, per oris Christi expirationem, sicut a nobis inspiratione in eundem locum trahitur spiritus. . . . Si in vascula illa cerebri, cum animali nostro lucido spiritu, tenebrosus et nequam spiritus intrudatur, tunc demoniacos furores videbis, sicut per bonum spiritum reuelationes." (Michael Servetus, *Christianismi Restitutio*, 1553, repr. 1790, pp. 173-4.)

which the soul passes while descending from its origin to this earth, or, if not identical, it has received successive celestial influences or imprints during this descent. Its natural shape is starlike, i.e. spherical. It is thus especially subject to astrological influences. It is the mean, the link, between the terrestrial (fleshly) body and the incorporeal soul. Its functions in this life are similar to those of medical spirits, but with more emphasis on imagination or phantasia and less on ordinary animal functions. It either is the irrational soul or is its vehicle. It may survive after death for a long period, or eternally.

Although in some measure it derives from Aristotelian and medical spirits, the astral body was for the Neoplatonists primarily a religious conception—an explanation, or justification, of theurgic practices, i.e. methods of approaching God and salvation which are non-intellectual, such as fasting, lustrations, the use of incense, incantations, etc. To all these practices the astral body corresponds exactly: being corporeal but subtle it can be acted on by physical things of a similar nature (vapours, scents, sounds); being the seat of the imagination, or of the irrational soul, it can be affected by prayers and images; since it survives after death, its purification is of the utmost importance.¹²

It is also, fortunately, unnecessary to go deep into its complex origins; but I wish to mention the following connexions, which are frequently made by Renaissance writers. First there is the passage in the *Timaeus*,¹³ which, together with the chariot images in the *Phaedrus*,¹⁴ is the ultimate origin of the term vehicle (ὄχημα): the demiurge “distributed a soul to each star, placing it in it as in a vehicle (or chariot) . . .”;¹⁵ he then explained to the souls the laws governing their successive incarnations and handed them over to the planets, who fashioned their bodies and the mortal parts of their souls. Plato, of course, may not *really* mean here that human souls have a starry body as a vehicle; but he does say that the planets form the lower soul, and certainly means to suggest the myth, as in the *Phaedrus*, of souls descending from beyond the stars down to this earth. Proclus, commenting on the *Timaeus*,¹⁶ connects Plato’s ὄχημα with Aristotle’s πνεῦμα or spirit. He is probably referring to the description of semen in Aristotle’s *De Generatione Animalium*,¹⁷ a description which is constantly quoted by sixteenth- and seventeenth-century medical writers: what makes semen fertile is, according to Aristotle, “the spirit which is contained in the foamy body of the semen, and the nature which is in the spirit, analogous to the element of the stars,” that is to say, an animal’s spirit has some special likeness to the fifth element (*quintessentia*) of which Aristotle’s heaven is made, or is identical with it, as many sixteenth-century writers interpret.

Aristotle’s πνεῦμα, which is roughly the same as the spirits of mediaeval medicine, Plato’s ὄχημα, and the Stoics’ πνεῦμα, which was for them identical

¹² Cf. Walker, *Spiritual and Demonic Magic*, Ch. II (ii).

¹³ Plato, *Timaeus*, 41D-42D.

¹⁴ Plato, *Phaedrus*, 246A-B, 247B.

¹⁵ Plato, *Timaeus*, 41D-E: “. . . διεῖλε ψυχὰς ἰσαριθμούς τοῖς ἀστροῖς ἐνειμε θ’ ἐκάστην πρὸς ἑκάστον, καὶ ἐμβιβάσας ὡς ἐς ὄχημα τὴν τοῦ παντὸς φύσιν ἔδειξε . . .”

¹⁶ Proclus, in *Tim.* III, 238, 20, quoted in Dodds’ ed. of Proclus, *El. of Theol.*, pp. 315-6: “ὄχημα . . . πνευματικόν, οἶον καὶ Ἀριστοτέλης ὑπέλαβε . . .”

¹⁷ Aristotle, *De Gen. Animal.*, 736B-737A: “. . . τὸ ἐμπεριλαμβανόμενον ἐν τῷ σπέρματι, καὶ ἐν τῷ ἀφρώδει πνεῦμα, καὶ ἡ ἐν τῷ πνεύματι φύσις, ἀνάλογος οὕσα τῷ τῶν ἀστρων στοιχείῳ.”

with the soul, constitute the three main sources of the astral body. Galen brings them all together in one of the places where he discusses the nature of the soul:¹⁸

If we are to declare the substance of the soul, we must say one of two things: either that it is the shining and aethereal body, at which conclusion the Stoics and Aristotle must logically arrive, even if unwillingly; or that it is an incorporeal substance, and that this body is its first vehicle, through which mean the soul receives communion with other bodies.

If we compare earlier Renaissance descriptions of the astral body with Fernel's, we find some significant differences. They are not in a medical context, but in a religious or philosophical one, and they are usually very cautious. This is what we should expect; the astral body is part of the Platonic (or Neoplatonic) *prisca theologia*,¹⁹ and it is one of the parts most difficult to reconcile with Christianity. It involves pre-existence of the soul and, usually, metempsychosis, and therefore, although it bears obvious likenesses to the Christian spiritual body or *corpus gloriosum*, it cannot be made to fit into Christian eschatology. Ficino, for example, in his *Theologia Platonica*,²⁰ is careful to begin his account of it with a denial of the astral descent of the soul and with such prefatory remarks as: "it is pleasant sometimes to play poetically with the ancients,"²¹ and to end it with a declaration of submission to Christian theologians. Nicolas Leonicus, who was probably Fernel's direct source, also prefaces and ends his dialogue *De Tribus Animorum Vehiculis*²² by solemnly warning his readers against accepting any Platonic views on the soul which do not conform to Christian doctrine, though he takes the astral body seriously enough to suggest that Ezechiel's four lamplike animals and Elijah's chariot of fire may refer to it.²³ Bessarion, it is true, defends it against George of Trebizond by taking it as a fabulous version of the Catholic spiritual body; but he too is evidently aware of the religious unorthodoxy it involves.²⁴ In general, then, one may say that the astral body normally appears in Renaissance writings as a religious conception (as it was for the ancient Neoplatonists), and as one that is known to be dangerously unorthodox.

We are then justified in our surprise at finding the astral body in Fernel's *Physiologia*, presented without a word of caution, as an aid to understanding medical spirits, and in asking why it is there. The answer is in another book of his, written earlier but published later, in 1548, the *De Abditis rerum Causis*,²⁵

¹⁸ Galen, *De Placitis Hippocratis et Platonis*, VII, *Op. Omn.*, ed. Kühn, V, 643: εἰ δὲ καὶ περὶ ψυχῆς οὐσίας ἀποφύνασθαι χρή, δυοῖν θάτερον ἀναγκαῖον εἰπεῖν, ἢ τοῦτο εἶναι τὸ οἶον αὐγοειδὲς τε καὶ ἀθερώδες σῶμα [λεκτέον αὐτὴν] εἰς ὃ, καὶ μὴ βουλῶνται, κατὰ ἀκολουθίαν ἀφικνουῦνται Στωϊκοὶ τε καὶ Ἀριστοτέλης, ἢ αὐτὴν μὲν ἀσώματον ὑπάρχειν οὐσίαν, ὄχημα δὲ τὸ πρῶτον αὐτῆς εἶναι τοῦτ' ὃ σῶμα, διὰ οὗ μέσου τὴν πρὸς ἄλλα σώματα κοινωνίαν λαμβάνει".

¹⁹ Cf. D. P. Walker, "The *Prisca Theologia* in France," *Journal of the Warburg and Courtauld Institutes*, XVII, 1954.

²⁰ Ficino, *Opera Omnia*, Basle, 1576, pp. 404

(*Theol. Plat.*, XVIII, iv), 405 (XVIII, v).

²¹ Ficino, *Op. Omn.*, p. 405: "delectat tamen cum antiquis interdum poeticè ludere."

²² Nicolai Leonici Thomaei *Dialogi*, Lyons, 1542 (Ded. to Reginald Pole, dated 1524), p. 82: "Alverotus, sive de Tribus Animorum Vehiculis." The whole dialogue is a commentary on the famous passage from Vergil: "Principio coelum et terra . . ." (*Aeneid*, VI, 724 ff.). The cautions are on pp. 91, 119.

²³ Leonicus, *ibid.*, pp. 102-3.

²⁴ Bessarion, *In Calumniatorem Platonis*, ed. L. Mohler, Paderborn, 1927, p. 367.

²⁵ I shall quote from *Joannis Fernelii Am-*

a dialogue in which are discussed the causes of procreation, growth and epidemic disease. In the theories he puts forward spirits of all kinds (medical, cosmic, alchemical) play a large part, and astrological influences a still greater one. In fact, his astrology goes beyond the bounds of orthodoxy. In a chapter where one speaker represents the views of Plato, another those of Aristotle, and a third those of the Scriptures, all three are shown to agree on a cosmology which makes God totally inactive after the initial act of creation, except for the production and implantation of human souls. All the speakers agree that:²⁶

What God once began by his own work, he has now, as if on holiday, handed over to the heavens, as to a steward, to be continued. And whatever things we say exist by natural laws, these in the first place proceed from God, who now undoubtedly generates very little directly, without the intervention of heaven, nature and seed, but who, having founded the laws of nature, administers everything through the heavens.

Now, according to Sherrington, Fernel by the time of the *De Naturali Parte Medicinae* (1542) had abandoned this extreme astrological viewpoint, and had even rejected all astrology. The evidence he brings for this assertion is: first, the biography of Fernel by his pupil Plancy, who states that Fernel had once believed in detailed astrological predictions, horoscopes, etc., but later came to reject them and look only to natural causes; secondly, the fact that the *Medicina* contains only a few references to astrological matters.²⁷

As for Plancy, apart from the fact that his biography was not published until over thirty years after his death, there is nothing in his remarks to show that he was thinking of the general astrological theory in the *De Abditis rerum Causis*. Rejection of judiciary astrology and a search for "natural" causes are quite compatible with astrology of a philosophical kind. As for the *Medicina*, the evidence really points in the opposite direction. In it Fernel several times refers to the earlier, though as yet unpublished, *De Abditis rerum Causis* as supplementary to this purely medical work.²⁸ The two books are plainly meant to be complementary, and the *Medicina* contains so few mentions of astrology, occult causes, etc., precisely because he had dealt with them fully in another work. It is also highly improbable that, if by 1542 Fernel had ceased to believe in the views expressed in the *De Abditis rerum Causis*, he would have published it in 1548 and again, revised and augmented, in 1551.

We may take it, then, as certain that, when writing the *Medicina*, Fernel still held the views on spirits and astrology expounded in the *De Abditis rerum*

biani de Abditis rerum Causis Libri Duo Denuo ab ipso authore recogniti, compluribusque in locis aucti, ad Henricum Franciae Regem Christianissimum. Aeditio Secunda, Paris, 1551.

²⁶ *Ibid.*, p. 70: "Quae Deus olim proprijs operibus inchoavit, eadem nunc quasi feriatu coelo tanquam administro continuanda credidit. Et quaecunque naturae legibus existere dicimus, eadem primum processerunt à Deo: qui certè nunc admodum pauca proximè, nec coelo, nec natura, nec semine interveniente ingenerat, sed conditis naturae legibus omnia per coelum administrat."

²⁷ Sherrington, *Endeavour of Jean Fernel*, pp. 22, 33-4, 52.

²⁸ E.g. Fernel, *Medicina*, 1554, p. 103 (reference to 1st Dialogue of *De abd. r. c.*, on innate heat not being elemental); cf. references given by Sherrington, *Endeavour*, pp. 22, 174-5, and Fernel, *ibid.*, *Praefatio* (in a list of what a physician must know, "coelorum & syderum conversiones, & que inde fluunt dimanantque virtutes orbis inferioris moderatrices observat"), pp. 227-9 (celestial nature of human semen and spirit).

Causis. He believed, as we have seen, that all occurrences in the natural world are governed by celestial influences; the heavens contain the forms of all things and transmit them by means of cosmic spirit (*spiritus mundi*) to the terrestrial world. Although the forms of the four elements derive ultimately from the heavens, their action is contrasted against that of this celestial spirit, the fifth essence. In any object the elements act in a constant manner which is wholly predictable from an analysis into the elemental qualities (hot, dry, cold, wet). But, over and above their elemental constitution, their temperament, all things have a spirit which derives directly or indirectly from the stars and is continually conditioned by them. In animals this spirit is the cause of generation and growth, of sensation and movement, of all that distinguishes a live from a dead body. It is what gives the animal its "total form," that is to say, what makes it an organic whole and not merely an agglomeration of parts.²⁹ This spirit, which bears the vital or innate heat, is present in the semen of the parents owing to some huge heavenly mutation, which impressed it there;³⁰ it is thence transmitted to the progeny, where it is also continually increased and influenced by celestial warmth—as Aristotle said: "Sol et homo generant hominem."³¹ Infectious diseases are a corruption of the animal's spirit by a morbid condition of the air, also caused by celestial influences.

It is now, I think, evident why Fernel mentions the astral body favourably when he is discussing medical spirits. He probably did not accept the theory wholly or literally, but would have regarded it, like any other part of the *prisca theologia*, as a mythical, "fabulous," presentation of a philosophical truth, namely, that the human spirit (like all other spirits) is produced and conditioned astrologically.³²

There now arises the further question: why did Fernel *want* this to be true? The main reason, as for many of his contemporaries, was, I think this: the supposition of astrological spirits extends the area of possible rational explanation to such things as procreation, embryology, infectious diseases, psychological disorders, which cannot be adequately explained by elemental causes, and would therefore, if no celestial causes were assumed, have to be incomprehensibly divine. The motive for making this assumption is perhaps to some degree metaphysical in the modern, pejorative sense. It is noticeable that Fernel seldom attempts to give any precise correlation between the positions and movements of the heavenly bodies and their effects in the terrestrial

²⁹ This is a very compressed summary of the whole of the first Book of the *De abd. r. c.*, in which Fernel propounds and defends his views in great detail. The passionate disbeliever in astrological causes, Brutus, is dramatically converted on p. 56.

³⁰ Fernel, *De abd. r. c.*, pp. 60-61; Aristotle, *Problems*, X, xiii (892A): "τὴν ἐξ ἀρχῆς γένεσιν τῶν ζῴων γενέσθαι διὰ τὰς μεταβολὰς καὶ μετακινήσεις τοῦ κόσμου καὶ τοῦ παντός οὕτω μεγάλας."

³¹ Fernel, *ibid.*, p. 54; Aristotle, *Physics*, II, 194 B 13: "ἄνθρωπος ἀνθρώπον γεννᾷ καὶ ἥλιος."

³² The astral body is of course only one

among many sources of this astrological conception of spirits, which appears in mediaeval medical authors, in Avicenna (*De viribus cordis*, *Libri in re medica omnes*, 1564, p. 325) for example, and has connexions with mediaeval alchemy and magic.

Fernel accepts the usual assumptions of the *prisca theologia*: that Plato learnt the Mosaic doctrine from the Egyptians, and that the Neoplatonists learnt to interpret Plato correctly from St. John, St. Paul and Dionysius the Areopagite (*De abd. r. c.*, pp. 3, 68).

world; that is to say, he does not use his supposition to construct a theory, but merely to assert the possibility of constructing one. Thus, in a large measure, Fernel's motives for believing in astrological spirits may have been just intellectual comfort. I mean that he was doing what people do today when they explain the extraordinary power and beauty of Bach's contrapuntal music by saying that it is "all mathematics"; if pressed to give a concrete example of the connexion between the two, they will probably disclaim any knowledge of mathematics—but they like to go on believing this almost totally empty theory, because it appears to explain something which would otherwise be frighteningly mysterious. This is borne out by the fact that Fernel barely mentions astrological remedies, although the infectious diseases he is discussing consist of a corruption of the victim's star-like spirit caused by an astrally determined condition of the air.

On the other hand, though the main motive for Fernel's astrology may have been only intellectual comfort, this does not mean that it was worthless or sterile. It contains perhaps the seeds of the by no means empty philosophies of nature later developed by such thinkers as Telesio and Campanella, Patrizi, Bacon or William Harvey. It is significant that the few concrete examples Fernel does give of astrological influence usually concern the action of the sun's warmth on generation, spontaneous or otherwise, and growth;³³ he constantly asserts that animals' vital heat is a "celestial heat" which derives from the heavens. He was perhaps getting near to that rationalization and simplification of astrology of the later sixteenth century, in which attention was concentrated on the sun and all celestial influences tended to be reduced to its warmth.

Another likeness between Fernel and Telesio and his followers is the difficulty they find in combining a thorough-going astro-spiritual cosmology with the Christian doctrine of the soul. All philosophies dominated by the concept of the spirit tend to be immanentist, and to leave little or no room for a transcendent, incorporeal soul that must be injected into a half-formed body which has been elaborated by its own spirit. When the concept of spirit is combined with astrology, as in Fernel, the difficulties become more acute; what transcendence there is in the system is put into the stars, and therefore, since the spirit derives from these, it becomes almost a double of the soul (or *vice versa*)—both have a celestial or divine origin (Fernel often calls the spirit divine), both are the total form of the body, both perform psychological activities. There are two ways out of this difficulty, neither of them quite philosophically satisfactory or religiously orthodox. Either one can get rid of the soul by identifying it, or merging it, with the spirit, as Melanchthon and, later, Agostino Donio and Jean Bodin did;³⁴ or, like Telesio, Campanella³⁵ or Descartes,³⁶ one can drastically restrict the functions of the soul, reducing them to purely abstract thought and religious contemplation (i.e. to those of the intellect, *mens*), and allow the spirit to perform all other psychological and vital functions. Unfortunately Fernel adopted neither alternative, and got

³³ E.g. Fernel, *De abd. r. c.*, pp. 54, 58, 61, 172.

³⁴ See Walker, *Sp. and Dem. Mag.*, Ch. V (iii) (Bodin), Ch. VI (ii) (Donio).

³⁵ *Vide ibid.*, Ch. VI (i) (Telesio), Ch. VII (Campanella).

³⁶ Descartes, *Traité des Passions de l'Ame*, 1649, art. 17 ff.

very tangled up, especially in his embryology, where of his two non-elemental, formative principles, both of them celestial and divine, one or other is plainly superfluous. Up till the fourth month the spirit shapes the foetus and is its formative principle; then, when heart and brain are complete, the soul is instantaneously injected and this becomes the body's total form.³⁷ At the moment of injection the soul is purely rational (is pure *mens*), but it then becomes one with the lower, vegetative and sentient, souls, which were already present in the spirit.³⁸

It seems impossible to make a coherent system out of Fernel's juggling with spirit and soul; it is not therefore surprising that his immediate successors criticized this aspect of his medical philosophy rather sharply, and that he is often cited as representative of those who abused the concept of spirit, who used it, as Harvey says, as a *deus ex machina* to resolve any difficult problems.³⁹ These criticisms are directed with especial vehemence against Fernel's astrological spirit, against his assertion that the spirit, or the innate heat in it, is celestial, aethereal; and in this connexion his use of the astral body is quite often attacked as well.⁴⁰

In his *De Somno et Vigilia*⁴¹ Joannes Argenterius, a self-consciously anti-Galenic and somewhat revolutionary medical writer, who denied the existence of animal spirits and kept only the vital, refers several times with contempt to Fernel's astral bodies; "for who," he asks, "could believe, let alone prove, that the soul is wrapped up in these garments and spirits?"⁴² He thinks that Fernel and his followers have been misled by "some Neoplatonists or other"⁴³ into recounting these fables and he implies that there are no genuine ancient authorities for the astral body. It is a pity, since they, like Argenterius himself,

³⁷ Fernel, *De abd. r. c.*, pp. 31 ff. (presence of spirit necessary to prepare foetus for reception of total form), 39 ff. (semen contains spirit, but *not* soul), 55-6 (summary: "Itaque cum multiplex illa sit & varia corporis praeparatio, tum ex quatuor illis rerum initijs haudquaquam corruptis, minutissimè & ex toto inter se confusis reddita temperatio, tum concinna corporis conformatio, & partium apta secum coniunctio, tum verò ingeni spiritus omnis commodatio: totus hic potentiarum ordo, à facultate, & vi seminis, & ab eo qui semen iecit dependet. Ubi verò iam omnis ad plenum absoluta est praeparatio, quo tempore consummatam potentiam dicimus, tum extrinsecus accedit ipsa species, naturali quadam & quasi dicas inevitabili necessitate"), 58 ff. and *passim* (spirit is not elemental, but celestial), 71 (even the *mens* appears to come from the *spiritus mundi*), 95, 103 (soul is incorporeal; only rational soul is immortal); *Medicina*, 227-8 (natural and sentient soul are in the spirit of the semen), 229 (but the rational soul comes extrinsically), 247-8 (at the fourth month, "quo tempore cor & cerebrum consummata jam sunt").

³⁸ Fernel, *Medicina*, pp. 160-1.

³⁹ William Harvey, *Opera Omnia: a Collegio Medicorum Londinensi edita*, London, 1766, pp. 115-16 (*Exercitatio Altera ad J. Riolanum*, 1649): "Vulgo enim scioli, cum causas assignare haud norunt, dicunt statim a spiritibus hoc fieri; et omnium opifices spiritus introducunt; et, ut mali poëtae, ad fabulae explicationem et catastrophem, θεὸν ἀπὸ μηχανῆς, advocant in scenam."

⁴⁰ The astral body also appears in Fernel's *De abd. r. c.*: pp. 95 (discussion of Galen on the soul-passage quoted above, note 18), 107.

⁴¹ Argenterius, *De Somno et Vigilia Libri Duo, in quibus continentur duae tractationes de calido nativo, et de spiritibus*, Florence, 1556.

⁴² Argenterius, *De Somn. et Vig.*, p. 303: "Quis enim potest non dicam probare, sed credere animum involvi his vestibus, & spiritibus?"

⁴³ *Ibid.*: "Alij verò qui dicunt, spiritum quendam esse divinum, immortalem, alium verò ex tenuiorum elementorum mistione concretum, excusationem merentur, quòd quum fabulosa quaedam se referre agnoscerent, nescio quos academicos hujus opinionis auctores faciunt."

have valiantly striven in other ways to make medicine more rational.⁴⁴ He suggests elsewhere that people believe in a lucid, shining spirit,

because they have seen angels, and other divine *numina*, represented by painters with a certain splendour and light, and have heard that these are spirits and are so called by theologians; so that in consequence they think that the spirituous stuff in our bodies must be similar.⁴⁵

A later critic of Fernel, Domenico Bertacchi, who in 1584 published one of the very few sixteenth-century monographs on spirits, reproves Argenterius for this last suggestion; the lucid quality of spirits is attested by the best authors, Galen and Avicenna, and is proved by such evidence as the radiant complexion of the young, cats' eyes shining in the dark, the colours you see if you rub your eyes.⁴⁶ He also corrects Argenterius' ignorance of the ancient authorities for the astral body; it is to be found not only in Plato and the Neoplatonists but also in the most ancient of the Magi, Zoroaster, as Ficino tells in his *Theologia Platonica*.⁴⁷ Nevertheless Bertacchi will not accept the astral body, nor even the more usual doctrine that the spirit is the seat or vehicle of the soul.⁴⁸ Nor will he admit the celestial quality of the spirit or of innate heat, though he admits that animal spirits are so subtle and lucid as to be very like the quintessence.⁴⁹

Jean Riolan, the father of the physician with whom Harvey had a controversy on the circulation of the blood, in his commentaries on Fernel's writings also expresses surprise at Argenterius' ignorance of Neoplatonic accounts of the astral body, and notes that Bessarion had defended it against

⁴⁴ *Ibid.*, pp. 287-9: "Fernelius (ut diximus) spiritum ponit quendam divinum ex caelo, divinaque substantia, immortalem, & sempiternum, inhaerentem, involventemque animum, alium verò impuriorem, minus illustrem, & splendidum ex tenuiore elementorum permistione concretum . . . [account of the three kinds of spirit] . . . Haec & similia illi doctissimi quidem viri, sed (ut arbitror) inveterata opinione, & Graecorum autoritate nimis persuasi, à communi hoc errore se nequaquam liberare potuerunt: quibus tamen multum certè tribuo, quòd illi nobiscum medicinam nostram liberè docere, & singula quantum assequi possunt ad rationem revocare, omni studio nituntur."

⁴⁵ *Ibid.*, p. 279: "Qui verò spiritum substantiam lucidam, & splendidam esse statuunt, videntur mihi in hanc opinionem venisse, quòd cernerent angelos, aliaque divina numina, cum splendore quodam, & lumine à pictoribus representari, eaque audiant spiritus esse, & vocari à Theologis: adeo ut postea putent, simile esse debere, quicquid in nostro corpore spirituosum est."

⁴⁶ Bertacchi, *De Spiritibus*, fol. 21^r-22^r.

⁴⁷ *Ibid.*, fol. 3^v-4^r: "Sciendum itaque est

hanc opinionem quam vetustissimam esse, licet Argenterius in sua enarratione artis medicinalis, nullius auctoris testimonio confirmatam esse dicat. Ut enim Plotinum aliosque Academicos praeteream: antiquissimus Zoroaster magorum caput, ut 18. lib. suae Theolog. (cap. 4) scribit Marsilius Ficinus hujus sententiæ fuit, quam postea divinus etiam Plato recepit. Vocabant itaque magi vehiculum & sedem animae corpusculum ex aethere acceptum . . ." (account of the astral body follows).

⁴⁸ *Ibid.*, fol. 4^v-5^r.

⁴⁹ *Ibid.*, fol. 5^r-6^r (critique of Fernel's celestial spirit: spirit cannot come from the heavens because these are not subject to change; it cannot descend from the planets because these move in their own orbits; Fernel admits that spirit is replenished from blood and breath, "Quod enim alimento instauratur, seu sustentatur, coeleste aut divinum esse non potest"; conclusion: "At quamvis revera spiritus æthereus esse non possit, valde tamen propinquus est perfectioni corporis coelestis: quippe qui ex optima materia genitus est, & ob diurtunam absolutamque concoctionem, tenuis ac splendidus est redditus").

George of Trebizond and connected it with Aristotle's spirit in the semen analogous to the element of the stars.⁵⁰ With some hesitations, Riolan seems willing to grant the celestial nature of the spirit.⁵¹

This was not usual for ordinary, non-Paracelsan, medical writers.⁵² The main objection (I think a valid one) brought by Argenterius, Bertacchi, Cureus and others, against Fernel's theory of the celestial spirit is that it is not self-consistent.⁵³ The Aristotelian celestial quintessence is inalterable and incorruptible; it cannot therefore be made the substance of medical spirits which, on Fernel's own showing, are nourished by blood and air (both elemental) and in are a constant process of dissipation and replenishment. When Aristotle said "analogous to the element of the stars," he meant "analogous," and not identical.⁵⁴

Joachim Cureus, a very conservative Aristotelian of the Paduan school, in his *Libellus Physicus* of 1572, not only points out this inconsistency in Fernel's theory, but also its dangers: Fernel's wrong interpretation of the Aristotle passage and

these hyperboles about aethereal heat and spirit and their like give opportunity to insolent and windy minds to deviate rashly from the doctrine of the ancients, and, as it were, seditiously to overthrow all the arts.⁵⁵

The insolent and windy minds are almost certainly the Paracelsans, whom he

⁵⁰ Jean Riolan, *Opera Omnia*, Paris, 1610, p. 35 (*Commentarius de spiritu et calido innato*): "Quae cum Argenterius scribit à Fernelio temerè conficta, satis ostendit quàm fuerit versatus in doctrina Platonicorum, apud quos vix quidquam occurrit frequentius: Bessario contra Trapezuntium contendit eandem ferè mentem Aristotelis, quando scribit . . ." (follows the passage quoted above, note 17).

⁵¹ *Ibid.*, p. 34 (after giving Fernel's views on the astral body, and quoting the Aristotle and Galen passages (*v. supra*, notes 17 and 18), Riolan concludes: "Sit ergo spiritus, corpus aethereum, caloris ac facultatum sedes ac vinculum, primumque obeundae functionis instrumentum"), 38-9 (after admitting the usual objections to a celestial spirit or innate heat, he remembers that the sun produces spontaneously generated worms, etc.; surely man is more noble than worms? "Equidem certè desino mirari si quaestione diligenter subducta & examinata, Fernelius cum Aristotele opificem calorem origine coelestem asserere maluerit quàm cum vulgo elementarem. Sit tamen de problematica quaestione liberum cuique iudicium, quia eadem manent medendi praecepta utrumvis deffendatur."), 127 (after several criticisms of Fernel's embryology, Riolan nevertheless accepts: "genitorem spiritum, cui, ut primo subjecto

vis conformatrix insidet, Sol impertit").

⁵² Paracelsan medicine, with which I am not competent to deal, is of course full of celestial spirits; the Paracelsan and the Fernelian traditions connect at one point at least, in Jacques Gohory, an enthusiastic promulgator of Paracelsan theories and a friend of Fernel, with whom he discussed them. See Walker, *Sp. and Dem. Mag.*, Ch. IV (i).

⁵³ Argenterius, *De Somn. et Vig.*, p. 275; for Bertacchi *v. supra*, note 49; Cureus, *περὶ αἰσθησεως, καὶ αἰσθητῶν Libellus Physicus, continens doctrinam de natura, & differentijs colorum, sonorum, odorum*, Witebergae, 1572, p. 262; cf. Jacques Aubert, *Progymnasmata, In Joan. Fernelii Med. Librum de Abditis Rerum Naturalium et Medicamentorum causis*, Basle, 1579, pp. 29-30.

⁵⁴ Cureus, *Lib. Ph.*, pp. 264-5: "Non fuit ita incogitans Aristoteles, ut aeterna & incorruptibilia misceret cum caducis & corruptibilibus, sed facit collationem ex analogia, sicut manifestè ostendunt verba."

⁵⁵ Cureus, *Lib. Ph.*, p. 264: "has hyperboles de calore & spiritu aethereo & similes, praebere occasionem ingenijs petulantibus & ventosis, ut temerè à doctrina veterum discedant, & quasi concitata seditione omnes artes conturbent."

castigates in his preface.⁵⁶ Cureus also shows up the weak spot in Fernel's embryology just mentioned (the doubling of soul and celestial spirit):

since the heavenly bodies are exempt from the mutability of generation and corruption, you will have to imagine that the heat from the heavens is infused into bodies by a miracle, as St. Thomas wished for the soul, and thus in man there will be two immortal bodies, the soul and the innate heat; which everyone, I think, will admit is absurd.⁵⁷

William Harvey, in his *De Generatione Animalium*, at several points speaks contemptuously of Fernel's celestial spirits. Fernel and others, he says, have invented a spirit and innate heat

of celestial origin and nature; namely a body most simple, most subtle, most fine, most mobile, most swift, most lucid; aethereal and participating in the quintessence. But nowhere have they demonstrated that there is such a spirit, or that it acts beyond the powers of the elements, or that it performs greater works than blood alone could do. We indeed, who in our investigations use sense as our guide, have not been able to find any such spirit anywhere.⁵⁸

In one of his *Exercitationes* against Jean Riolan the younger, he remarks that, in inventing these miraculous spirits, Fernel and his followers are

like the ignorant multitude who, when they do not grasp the causes of events, believe and proclaim that Gods are the direct authors of them.⁵⁹

But by this time attacks were being made on the existence of any kind of medical spirits. Harvey, still taking Fernel as their chief representative, criticizes the vagueness and ambiguity of the term,⁶⁰ and denies that there is any empirical evidence for the existence of spirits. Of the cavities which were supposed to contain them the heart and arteries are full of blood, and the ventricles of the brain are designed merely for drawing off cerebral excrement.⁶¹

⁵⁶ *Ibid.*, sig. B 4^r - B 5^r.

⁵⁷ *Ibid.*, p. 262: "cū corpora coelestia exempta sint mutabilitati generationum & corruptionum, imaginaberis ex miraculo, ut Thomas voluit de anima, calorem coelitus corporibus infundi, & ita in homine duo erunt immortalia corpora, anima & calor natus, quod ex omnium, ut opinor, confessione absurdum est."

⁵⁸ Harvey, *Exercitationes de generatione animalium*, 1651, in his *Opera Omnia*, London, 1766, p. 524: "Scaliger, Fernelius, alique, sanguinis eximias dotes minus perpendentes, . . . finxerunt itaque spiritum, caloremque innatum alium, coelestis originis et naturae; corpus nempe simplicissimum, subtilissimum, tenuissimum, mobilissimum, velocissimum, lucidissimum, aethereum, quinaeque essentiae participem. Nuspiam tamen demonstrarunt ejusmodi aliquem spiritum dari, aut eundem supra vires elementorum agere, vel majora opera praestare quam sanguis solus

possit. Nos sane, qui perscrutandis rebus sensu duce utimur, talem aliquem nullibi invenire potuimus."

⁵⁹ Harvey, *Exercitatio Altera ad J. Riolanum*, 1649, *Op. Omn.*, p. 119: ". . . illos spiritus, sublimes, lucidos, aethereos, coelestis naturae, divinos, vincula animae, esse consimiliter comminiscuntur; veluti vulgus imperitorum, quorum operum causas non capiunt, Deos immediatos auctores opinantur et praedicant."

⁶⁰ *Ibid.*, p. 116.

⁶¹ Harvey, *De Gen. An., Op. Omn.*, pp. 524-525: he quotes Fernel, *Physiol.*, IV, ii (*Medicina*, p. 105), on this, and comments "Nos autem, arterias, cordisque sinus, quamdiu animal superstes est, sanguine impleri dicimus: ventriculos quoque cerebri tam excellenti muneri inidoneos judicamus, eosdemque excrementis secernendis potius factos credimus."

Though Harvey apparently rejected spirits, celestial or otherwise, he was by no means free of them. For, by the time we have finished reading the *De Generatione Animalium*, we realize that something very odd has happened. The spirits are indeed gone; but blood has not only taken their place, it has also taken over all their functions, including sensation,⁶² and has acquired their divine and celestial nature. It has even adopted their terminology wholesale; the following passage might come out of Fernel or Ficino, if one substituted "spirit" for "blood":

Indeed it is blood in which the vegetative and sensitive activities first shine forth; into which heat, the primary and immediate instrument of the soul, is born; which is the common bond (*vinculum*) of body and soul; and by which, as a vehicle, the soul influences all parts of the body.⁶³

It is blood, not spirit, which now fashions the embryo, beginning with the tiny red, jumping speck (*punctum saliens*), which is the first sign of life in a fertile egg. The familiar Aristotelian text, so beloved of Fernel, is applied by Harvey to the blood, which now contains "a nature analogous to the element of the stars."⁶⁴ It is blood that should properly be called spirit, which is truly celestial and indeed supernatural, which forms and governs the whole body, "not otherwise indeed than the stars above, especially the sun and moon, keeping their eternal circuits, vivify the lower world."⁶⁵ The heart is "the Sun of the microcosm."⁶⁶

Fernel's error then, according to Harvey, lay, not in postulating supra-elemental, celestial powers in all living organisms, but in ascribing them to a fictitious spirit, instead of to the obvious, visible substance, blood.⁶⁷

⁶² Harvey, *De Gen. An., Op. Omn.*, p. 397, 532 ("Habet [sc. sanguis] profecto in se animam primo ac principaliter, non vegetativam modo, sed sensitivam etiam et motivam . . .").

⁶³ Harvey, *De Gen. An., Op. Omn.*, p. 398: "Certe sanguis est, in quo vegetativae et sensitivae operationes primo elucet: cui calor, primum et immediatum animae instrumentum, innascitur: qui corporis animaeque commune vinculum est: et quo vehiculo anima omnibus totius corporis partibus influit."

⁶⁴ For Aristotle *v. supra*, note 17; Harvey, *ibid.*, pp. 397 ("in genitura ac sanguine reperiri divinum quid, respondens elemento stellarum"), 527, 531.

⁶⁵ Harvey, *ibid.*, p. 532: ". . . dum nempe perpetim universum corpus peragrat [sc. sanguis], partesque omnes, quas ipsemet fabricat sibi adjungit, nutrit, fovet, ac in vivis sustentat: non aliter certe quam superiora astra, sol praesertim et luna, servatis perpetuo circuitibus, inferiora ista vivificant."; pp. 523-4: "Non est opus profecto spiritum aliquem a sanguine distinctum quaerere, aut calorem aliunde introducere,

Deosve in scenam advocare, philosophiamque fictis opinionibus onerare: domi scilicet nascitur, quod vulgo ab astris petimus . . . apud medicos tot sunt spiritus, quot partes corporis praecipuae, aut operationes; nempe animales, vitales, naturales, visivi, auditorii, concoctivi, generativi, implantati, influentes, et caeteri. Sanguis autem, pars corporis primogenita et principalis, virtutibus hisce omnibus dotatus, agendique postestate prae caeteris praeditus est; ideoque κατ' ἐξοχὴν spiritus nomen meretur"; p. 529: "Sanguis itaque est spiritus, ob eximias ejus virtutes et vires; est etiam coelestis; siquidem in illo spiritu hospitatur natura, nempe anima, respondens elemento stellarum; id est, aliquid coelo analogum, coeli instrumentum, coelique vicarium." Cf. Walter Pagel, "William Harvey and the Purpose of Circulation," *Isis*, XLII, 1951.

⁶⁶ Harvey, *Exercitatio Anatomica de motu cordis et sanguinis in animalibus*, 1628, *Op. Omn.*, p. 49: "Ita cor principium vitae et sol microcosmi . . . toti corpori praestat lar iste familiaris, fundamentum vitae, auctor omnium"; *De Gen. an., Op. Omn.*, p. 531.

⁶⁷ cf. passage quoted above, note 58.

This wholesale transference of nearly all the qualities and functions of the spirit to the blood does achieve the elimination of a fictitious entity, but it also produces a new crop of confusions, errors and blind alleys, some of them also caused, oddly enough, by Harvey's truly scientific empirical methods. In his physiology it leads to two obvious defects. First, Harvey argues at length against the traditional theory that the difference between arterial and venous blood is due to the presence in the former of more spirit, made from blood and breathed air; that arterial blood contains no air, nor any other spirituous or vaporous substance, can be experimentally proved by severing an artery under water—no bubbles arise.⁶⁸ He accounts for the difference, somewhat vaguely, by the vivifying effect of the pulsation of the heart.⁶⁹ There is then, for Harvey, no connexion between the colour of arterial, as opposed to venous, blood and respiration, whereas for Fernel, or any other believer in spirits, there was. Secondly, the nervous system presents insoluble difficulties, which Harvey avoids by never mentioning it at all.⁷⁰ Even if one ascribes to blood all the functions of animal spirits, the long known fact remains that sensation and motor-activity are linked with nerves, not with veins and arteries, and the fact, which also Harvey surely knew, that the brain and nerves do not contain blood.⁷¹

In his theory of generation Harvey is obliged to extend the powers of blood to semen and even to the egg (in the *De Generatione Animalium* he deals chiefly with chickens), since there is evidently some process of development going on before the first appearance of the speck of blood; semen, as well as blood, contains "a nature analogous to the element of the stars."⁷² Moreover this nature has more mysterious powers than were ever ascribed to celestial spirits. Harvey was convinced that semen did not penetrate to the uterus; this he had proved empirically, to his own satisfaction, by dissecting the recently fertilized wombs of deer and hens, and by experiments in which he failed to blow air through the vagina of a hen.⁷³ He offers several tentative explanations of the fact that nevertheless conception does not occur without fertilization: perhaps the whole body of the hen is rendered fertile by the semen;⁷⁴ perhaps it acts at a distance like a magnet, or like a star;⁷⁵ or perhaps its action is like that of a contagious disease.⁷⁶ But the explanation which he evidently prefers, though he is very shy in presenting it, is as follows. The interior of a womb

⁶⁸ Harvey, *Exerc. alt., Op. Omn.*, p. 120; Harvey does sometimes say that arterial blood is more spirituous than venous; but he denies that spirits are anything more than a quality of living blood (i.e. blood within the body, *sanguis* as opposed to *cruor*), or can exist separately from it (*ibid.*, p. 117).

⁶⁹ Harvey, *Exerc. An. de motu cordis, Op. Omn.*, p. 49.

⁷⁰ Harvey does occasionally mention nerves when expounding his adversaries' doctrine of spirits (e.g. on Fernel, *Op. Omn.*, p. 116), but not when putting forward his own views.

⁷¹ From lecture notes of Harvey, dated 1616 (*Prelectiones Anatomicae Universalis*, ed. Committee of the Royal College of Physicians

of London, 1886, p. 94), it appears that he thought that nervous transmission was analogous to that of light.

⁷² Harvey, *De Gen. An., Op. Omn.*, pp. 300, 358 (egg), 331 ("Neque enim gallus, per simplicem geniturae emissionem, foecunditatem aliquam gallinae aut ovis ejus adfert; sed quatenus genitura isthaec prolifica est, et vi plastica imbuta; spiritosa nempe, effectiva, et analoga elemento stellarum"), 397, 527.

⁷³ *Ibid.*, pp. 202-3, 325 f., 347, 361, 497 f., 592.

⁷⁴ *Ibid.*, p. 325.

⁷⁵ *Ibid.*, pp. 375, 592.

⁷⁶ *Ibid.*, pp. 373-4.

ready for conception resembles a brain in appearance; we might therefore conjecture that their functions are similar. In the same way as a mental, immaterial appetite or image is conceived in the brain by the stimulus of an external object, and results in a corporeal action appropriate to, or an artifact resembling, that object, so the male, the more perfect animal, produces by coition an immaterial desire in the female's womb, which results in a corporeal reproduction of the father.⁷⁷

This is perhaps a genuine explanation in the sense that it explains a process of which we are not directly aware (the conception of offspring) in terms of a process (the coming into being of a mental state) of which Harvey probably thought we are directly conscious. But it is plainly not a scientific explanation in the modern sense of the term, because it removes the process to be explained outside the realm of possible experiment, whereas Fernel's astrological theory of generation,⁷⁸ in spite of its vagueness and confusion, might possibly be tested empirically (e.g. by seeing whether the fertility of certain species of animal corresponded with certain dispositions of the heavens). Fernel, of course, would not have thought that science must be empirically based; but Harvey evidently did—indeed the necessity for his explanation of generation arose only because of his careful, but misleading, experiments on deer and hens.

⁷⁷ Harvey, *De Gen. Anim., Op. Omn.*, pp. 594-5; cf. pp. 387-8. This theory may ultimately derive from the Platonic conception of the womb as a separately animated being, which was revived in medical circles in Rabelais' time.

⁷⁸ Harvey was by no means averse to astrological causes, of a simplified, sun-centred kind; cf. *De Gen. An., Op. Omn.*, pp. 380 (the cock is not perhaps the "causa efficiens prima" of the fertile egg; "videtur enim rerum omnium generatio coelitus originem ducere, atque solis lunaeque motum sequi");

383 ("Gallus igitur et gallina vere potissimum foecundi fiunt; tanquam sol, vel coelum, vel natura, vel anima mundi, vel Deus omnipotens (nam eodem haec redeunt) iis causa superior ac diviniore in generatione foret. Ita sol et homo [*v. supra*, note 31] (id est, sol per hominem, ceu instrumentum) hominem generant. Eodemque modo, sator omnium et gallus ovum generant, et ex ovo pullum: accessu nempe et recessu solis perpetuo; qui ex divini numinis voluntate vel fato gignendis rebus omnibus inservit"), 420.